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of lead toward the force of gravitation. Whether or not this is so may easily be ascertained through physical tests which might preferably be in the nature of comparative pendulum measurements, lead derived from uranium ore being obtainable in sufficient quantities for the purpose.

The generally accepted law according to which the ratio of weight to mass has a fixed value in the same locality, irrespective of the nature of the substance, is largely empirical, as there are a number of elements for which the law has never been proved. Considering the very irregular distribution of other properties, like magnetism and radioactivity, among the elements, it would not be surprising if deviations were found to exist in their gravitational properties as well.

From this point of view, *i. e.*, if deviations actually exist in the value of gravitational acceleration for the various forms of lead, the chances are that the value in any case will be proportional to the atomic weight, as in this instance the atomic mass, being the ratio of either, would come out the same for all forms of lead. Such a result would go far toward reconciling the discrepancies in atomic weight with already established theories, because what is really of interest, both from a physical and chemical standpoint, is not so much the weight of the atom as its mass. Weight is only an attribute of mass, the latter having long been recognized as the more basic entity.

The theories on gravitation are still in a crude shape, but if the attraction is assumed to be due to the movements of the electrons constituting the atoms a possible deviation in the gravitational attraction of uranium lead might perhaps be ascribed to a gradually subsiding state of tension or agitation among the electrons, caused by the splitting up of the atoms during the radioactive processes, conditions being thus comparable to those supposed to obtain in a permanently magnetized piece of steel. On this assumption uranium lead would, in course of time, increase in atomic weight, changing slowly into ordinary lead, while the lead derived from various uranium minerals might properly be considered as rep-

resenting intermediate stages in this process of relaxation.

ANDERS, BULL

BROOKLYN, N. Y.

WORKING UP IN A SWING

TO THE EDITOR OF SCIENCE: Mr. A. T. Jones has an article on this subject in the current volume of SCIENCE, p. 20, July 4, 1919. In the beginning he makes a statement as follows:

As I do not recall ever seeing any discussion of this matter, the following note may not be out of place.

I wish to call Mr. Jones's attention to E. J. Routh's, "Dynamics of a System of Rigid Bodies" (Macmillan), Vol. I., Art. 287, entitled "Examples of Living Beings." In example 6 he will find a complete solution of his problem, with the necessary mathematical equations.

V. KARAPETOFF

CORNELL UNIVERSITY,

July 8, 1919

TO THE EDITOR OF SCIENCE: The letter in SCIENCE of July 4, by Professor Arthur Taber Jones, on "working up" in a swing, recalls to the writer that while studying the problem, several years ago he found several references to the subject.

In the *Zeitschrift für physikalischen und chemischen Unterricht*, 16, 230, 1913, H. Lohmann describes an apparatus by means of which the process of "working up" may be demonstrated. This consists of a plunger electromagnet, suspended as a pendulum, with its axis vertical. Raising and lowering the center of gravity of the suspended mass is accomplished by means of a key which controls the position of the plunger within the solenoid. The circuit is closed, and the plunger (and therefore the center of gravity) is raised when the key is in the "up" position; the plunger drops a short distance when the key is depressed. By imagining himself in a swing, the operator has no difficulty in so manipulating the key that the raising and lowering of the center of gravity of the swing-

ing mass are properly timed to bring about the increasing amplitudes.

The subject is treated analytically in the same journal by A. Hartwich, Vol. 17, 27, 1914. He arrives at an expression identical with that for Kepler's second law.

PAUL E. KLOPSTEG

PHILADELPHIA,
July 9, 1919

SCIENTIFIC BOOKS

Sewage Disposal. By LEONARD P. KINNICUTT, late Director Department of Chemistry, and Professor of Sanitary Chemistry in the Worcester Polytechnic Institute; C.-E. A. WINSLOW, Professor of Public Health in the Yale School of Medicine and Curator of Public Health in the American Museum of Natural History, New York, and R. WINTHROP PRATT, Consulting Engineer, M.Am. Soc.C.E. Second Edition, rewritten. New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Ltd. Cloth; 6x9 in. Pp. 547. Illustrated. \$4.00.

The first edition of this book which was reviewed by the writer in SCIENCE, February 10, 1911, Volume XXXIII., page 222, has been a successful reference book for students studying the fundamental principles of this branch of municipal sanitation. The present edition has been thoroughly revised and increased in size by about one hundred pages.

Progress has been rapid during recent years in this branch of the field of municipal sanitation. The revision of this book is timely as it is generally recognized that activities along this line, retarded by the world war, will shortly be taken up again with renewed vigor.

The style of the book is attractive and it is well arranged for use in the class room. Fundamental principles are clearly stated and use is made liberally of practical illustrations drawn from various important documents and investigations not only in this country, but abroad.

In bringing the book up to date, attention has been paid in particular to the activated sludge process, the two-story tank for the

removal of suspended solids, with a comprehensive recital of advantages and disadvantages as now understood, and improvements in the fine screening of sewage, and progress in disposal of sewage sludge and the recovery of grease and fertilizing constituents from these waste products. Investigations conducted on a comprehensive scale at Cleveland, Chicago, Milwaukee and New Haven are described with summaries of results, as published. One of the merits of the book is that it is written from the viewpoints of the engineer, the chemist and the bacteriologist, thus bringing out for the consideration of the sanitarian and student the general principles of the subject from the angles stated, as is necessary in order to appreciate the practicability and efficiency of the respective methods.

The authors deserve commendation for their temperate statements on topics where current literature shows differences of opinion due presumably to variations in local conditions not as yet fully understood.

Little attempt has been made to set forth completely the most recent results obtained from the operation of plants most lately installed in this country. This may prove disappointing to some who devote themselves entirely to work in this particular field, but it is probably wise on the part of the authors to base a book for class room use on the broad historic background which as stated in the preface, forms the surest basis for real comprehension of the general principles of the subject as now understood. Teachers and students of this subject should welcome this new volume.

GEORGE W. FULLER

SPECIAL ARTICLES

THE POSSIBLE PRESENCE OF CORONIUM IN HELIUM FROM NATURAL GAS

ONE of us (Cady), with McFarland,¹ observed a number of lines in the spectra of samples of helium obtained from natural gas which did not belong in the spectra of helium,

¹ Kansas University Geological Survey, "The Composition of Natural Gas," p. 264.

² *Proc. Roy. Soc.*, 67, 467, 1901.